

Air Force CRADAs

		<i>Address Warfighting Needs</i>	<i>Reduce Cost</i>	<i>Strengthen the Industrial Base</i>	<i>Promote Basic Research</i>	<i>Assure Quality</i>
AF1	Automated Software for Composite Material Analysis			●	●	
AF2	Covert Adjustable Laser Illumination CRADA	●		●		●
AF3	Hazardous Materials Management System		●	●		
AF4	Helmet Mounted Display Fitness of Use	●			●	
AF5	Ogden Air Logistics Center X-Ray/Computed Topography Sections			●	●	
AF6	Strategic Avionics Battle Management Evaluation and Research (SABER)	●	●			
AF7	Test and Evaluation of Imaging System	●		●		
AF8	USAF CRDA Between Weber State University and the Science and Engineering Laboratory				●	
AF9	Warhead Arena Test				●	
AF10	Whole Spacecraft Isolation System for Taurus/GEOSAT	●	●		●	

AF1

Title: Automated Software for Composite Material Analysis

Federal Partner: U.S. Air Force Research Laboratory, Materials and Manufacturing Directorate, (AFRL/ML)

Federal POC: Dr. Nick Pagano

Non-Federal Partner: AdTech Systems Research, Inc.

Status: Closed



*Automated System for Composite Analysis
Software and User's Manual*

Summary:

Modern composite materials are unique in the directional dependence of their strength, stiffness and thermal expansion characteristics and are not amenable to the use of design and analysis procedures employed for conventional isotropic structural materials. The use of modern composites has been steadily increasing and to make the best use of their capabilities, it is extremely important that sophisticated and reliable analysis procedures be established. A number of computer programs and advanced theories for predicting the response characteristics of advanced composite structural materials have been developed and their use continues to grow.

Under a CRADA, Adtech Systems Research and the Air Force Research Laboratory, Materials and Manufacturing Directorate, were able to develop a fully documented commercial software package, Automated Software for Composite Analysis (ASCA). This software package consists of solution procedures for the efficient analysis of composite materials that are leading to new and innovative avenues for developing optimum designs and establishing new goals.

Value/Benefits to DoD:

Supports DoD Management Principle: Strengthen the Industrial Base

The software package developed under this CRADA is serving the needs of both the Government and private industry. Customers of the package include the aircraft industry (such as Boeing, Lockheed, and United Technologies), composite materials manufacturers, the automobile industry, academia, research organizations, and spacecraft manufacturers. The number of organizations actively pursuing the development of the use of composite materials is growing.

Supports DoD Management Principle: Promote Basic Research

This CRADA provided DoD with the availability of automated software that provides a better understanding of composites and can be used to perform complex composites analysis in the design of military systems. ASCA has been used by many major manufacturers of military systems employing advanced composites.

Benefits to Non-Federal Partner:

This CRADA led to the commercialization of a software package. Based on the experience with this software code, AdTech has developed additional software packages.

Other Benefits:

The Air Force received \$2K in royalties from the software sales to industry. The value to the Directorate of developing the program and software to reliably perform composite analysis is conservatively estimated to be \$100K, in terms of equivalent contracting costs.

AF2

Title: Covert Adjustable Laser Illuminator CRADA

Federal Partner: U.S. Air Force Research Laboratory, Directed Energy Directorate, (AFRL/DE)

Federal POC: Capt. William Cooley

Non-Federal Partner: FLIR Systems, Inc. (FSI)

Non-Federal POC: John Miller

Status: Open

Summary:

The objective of this CRADA between the Air Force Research Laboratory, AFRL, and FLIR Systems, Inc., FSI, was to explore the feasibility, applicability, safety and utility of a fiber coupled diode laser to illuminate an image from a gimbaled assembly. An eye-safety analysis, a positive phenomenology study, and successful ground and airborne field tests were performed.

The integrated system developed in this CRADA enhances FLIR's gimbaled IR sensor system by allowing an area of terrain to be illuminated by a laser and viewed on a screen. The range for this system is approximately 1 km. When used in search and rescue operations, the viewing range can be 5 to 10 km.

FLIR transferred \$10K to the AFRL on the front-end to cover travel costs associated with AFRL personnel going to Oregon for collaborative meetings. It is estimated that royalties from future licenses will bring \$.5M into the AFRL.

Value/Benefits to DoD:

Supports DoD Management Principle: Address Warfighting Needs

Many Federal and local government entities have a need to positively identify ships and aircraft that are detected by electro-optical sensor systems. This identification must be quick, accurate, and admissible in a court of law. This CRADA has proved that this can be accomplished even for difficult cases such as maritime patrol.

Supports DoD Management Principle: Strengthen the Industrial Base

This work resulted in transitioning the technology to a FSI where they are actively pursuing incorporating the technology into a commercial system. Potential buyers include the U.S. Border Patrol, U.S. Coast Guard, Canadian Government, and the German Navy.

Supports DoD Management Principle: Assure Quality

The development of an integrated system was derived from the core competencies of both the Air Force Research Laboratory and FLIR Systems Inc. While the Air Force's expertise is in the development of fiber coupled diode lasers, FSI's expertise is as a commercial vendor for products that employ a stabilized Gimbal sensor system with thermal capabilities.

Benefits to Non-Federal Partner:

The industrial partner is actively pursuing commercializing the technology developed under this CRADA.

AF3

Title: Hazardous Materials Management System

Federal Partner: U.S. Air Force Research Laboratory, Materials and Manufacturing Directorate (AFRL/ML)

Federal POC: Frank Borasz, Larry Bidwell and Haywood Burnette

Non-Federal Partner: Modern Technologies Corporation

Non-Federal POC: Larry Harms

Status: Closed



Summary:

The U.S. Air Force Research Laboratory, Materials and Manufacturing Directorate (AFRL/ML), uses more than 10,000 different chemicals in over 40,000 containers in its 15 facilities. This level of activity and complexity necessitates a very aggressive pollution prevention program to assure that health and safety are a top priority and that environmental issues are correctly managed.

The AFRL/ML in cooperation with Modern Technologies Corporation developed a computerized system using bar code technology to coordinate the tracking and control of hazardous materials including levels, location changes, usage rates, and other critical data. The system, LINDEN™ Environmental Management System (LINDEN™), enables effective centralized hazardous materials management, waste minimization and pollution prevention efforts, a reduction in materials costs, and prevention of materials shortages through more effective control and retrieval. Using system data, the storage of hazardous chemicals is consolidated, helping to eliminate duplicate and excess stock.

At the Directorate, over 40,000 hazardous materials and waste containers were tracked throughout their complete use life, resulting in purging of over 10,000 hazardous material containers no longer needed by researchers. More than 400 containers of unknown materials were identified, classified and eliminated. In some cases, the effort permitted the identification of replacement chemicals that are less harmful to the environment. The system was extended to include laboratory facilities across Wright-Patterson AFB and has been selected for implementation at other government installations.

Value/Benefits to DoD:

Supports DoD Management Principle: Reduce Cost

The value in using the LINDEN™ system to reliably manage a hazardous materials program at the Air Force Research Laboratory, Materials and Manufacturing Directorate, is conservatively estimated to be \$10K in terms of equivalent contracting costs. The LINDEN™ system saves labor hours that would typically be spent on documentation and tracking.

Supports DoD Management Principle: Strengthen the Industrial Base

The LINDEN™ Environmental Management System is a commercialized product that is now available for both Government and industry use.

Benefits to Non-Federal Partner:

Modern Technologies was able to use the Air Force facilities and personnel as a means of Beta testing their software package. As a result of the feedback received from the Beta test site, the industrial partner was able to develop and commercialize the LINDEN™ software package.

Recently, Modern Technologies has produced a more advanced system with additional functionality and a web interface.

Other Benefits:

The Air Force received \$4K in royalties from the sale of the LINDEN™ system to industry. At least \$100K in software has been installed at government installations such as the Center for Disease Prevention and Control, Atlanta, GA and the Army Redstone Arsenal in Huntsville, AL.

AF4

Title: Helmet Mounted Display Fitness of Use

Federal Partner: Air Force Research Laboratory, Human Effectiveness Directorate, (AFRL/HE)

Federal POC: Brian Tsow

Non-Federal Partner: KOPIN Corporation

Non-Federal POC: Mike Presz

Status: Open

Summary:

Wearable computers and eye piece technology are stepping stones to providing maintenance technicians with the right information at the right time and place, enabling agile combat support. In a CRADA between the Air Force Research Laboratory, Human Effectiveness Directorate, and KOPIN Corporation, a fitness of use study was undertaken to examine the effectiveness of Helmet Mounted Displays (HMD) in mobile computing applications.

The two main elements in the fitness of use study included a visual effects study and a usability study. This CRADA provided KOPIN with access to an actual military maintenance environment for the evaluation of the HMDs for use as a maintenance tool. The Air Force was able to provide valuable feedback to KOPIN on the use of the HMD resulting in a commercialized product.

For the study, three HMDs and one man-mounted battery pack kit (including belt mounted battery pack, two batteries, charger and interface cables) were fabricated, tested and delivered to the Air Force. These hardware assets are to remain the property of the Air Force in exchange for services rendered and will be maintained by KOPIN for a period of one year following completion of the study at no charge to the Air Force.

Value/Benefits to DoD:

Supports DoD Management Principle: Address Warfighting Needs

The information collected under this CRADA will be used to support Air Force Integrated Maintenance Information System (IMIS) efforts that are currently using portable computers for the display of maintenance technical information. Several of the IMIS programs in the Air Force (F-22 IMIS, F-16 IMIS, and JSTARS IMIS) are interested in monocular displays for possible out-year technology insertion.

The CRADA effort identified deficiencies and areas for improvement in miniature display devices and their mounting type. The CRADA effort has provided a much clearer picture of the technician's needs in a real flight line situation and it has shown the Air Force that there may be a better way to maintain their aircraft.

Supports DoD Management Principle: Promote Basic Research

AFRL/HE possesses one of the largest data bases in the DoD on actual maintenance technician performance with the use of a monocular display device. As part of the CRADA, the Air Force Research Laboratory collected additional quantitative and qualitative data on the use of a monocular eye piece device for presenting maintenance technical instructions to C-141 and F-16 technicians performing a routine maintenance repair.

Benefits to Non-Federal Partner:

This CRADA provided KOPIN with access to a real working maintenance area which provided them with the information necessary to modify their display. KOPIN also believes that the automotive industry and other industries may benefit from this product leading to new market opportunities.

Other Benefits:

The estimated value of the hardware assets is \$17,250 (not including time and material expenses associated with maintenance and repair for the Air Force). The one year maintenance and service value is estimated at \$3,000. In addition, KOPIN will fund the Air Force Research Laboratory an additional \$10,000 for a total CRADA resource value (funds, personnel, services, property and equipment) of \$30,000.

AF5

Title: Ogden Air Logistics Center X-ray/Computed Tomography Sections

Federal Partner: Ogden Air Logistics Center

Federal POC: Art McCarty

Non-Federal Partner: ARACOR, Sunnyvale, CA

Non-Federal POC: Richard Savage

Status: Open

Summary:

The objective of the CRADA between ARACOR and the Ogden Air Logistics Center is to provide ARACOR access to unique Air Force Computed Tomography (CT) equipment for evaluating new hardware and software features and exploring new applications for the powerful, new CT technology.

The Air Force currently uses an ARACOR CT machine to examine its Minuteman solid rocket motors for cracks and abnormalities within the propellant. ARACOR wanted to enhance the machine's capabilities with new software and hardware features, but was limited in available demonstration sites. This CRADA provided ARACOR with the ability to utilize the Air Force equipment for testing and evaluation of its new hardware and software configurations.

The Air Force made the CT equipment and facilities available to ARACOR on a non-interference basis and was reimbursed \$75K for associated direct support costs. The CRADA allowed unique Air Force equipment to be used, in otherwise idle times, to inspect rocket motors.

The technology used in this CRADA enables parts to be examined for interior cracks and deformities by a machine much like x-ray equipment. Methods of inspecting canisters designed for storage and disposal of nuclear waste were evaluated under this CRADA. ARACOR is also evaluating CT as a key tool for reverse engineering parts for which there are no accurate engineering drawings or CAD files. DOE has expressed interest in this technology for the examination of nuclear weapons and parts. Chrysler, Ford and VW have also expressed interest for the inspection of various parts.

This CRADA was extended for an additional two years.

Value/Benefits to DoD:

Supports DoD Management Principle: Strengthen the Industrial Base

The DLA has shown interest in the use of CT as a tool for the reverse engineering of parts for applications in the resupply of defense components, such as spare parts for aircraft, in cases where there are no remaining commercial sources.

DoE is interested in using this CT technology for examining nuclear weapons to support disassembly. The auto industry is also interested in this type of inspection technology for use in the examination of various auto parts.

Supports DoD Management Principle: Promote Basic Research

Basic research was advanced in the use of CT technology through the sharing of research data collected by the industrial partner. The Air Force also benefited from exposure to new test procedures, software, and analysis techniques.

Benefits to Non-Federal Partner:

The industrial partner has potential markets for this nondestructive inspection technology in the auto industry as well as with DoE and DLA.

AF6

Title: Strategic Avionics Battle Management Evaluation and Research, (SABER)

Federal Partner: U.S. Air Force Research Laboratory, Human Effectiveness Directorate, (AFRL/HE)

Federal POC: Gil Cooperman

Non-Federal Partner: Northrop Corporation

Non-Federal POC: James Reis

Status: Closed

Summary:

The objective of this CRADA was to plan, design, conduct, analyze, document, and report on concept demonstrations of advanced Air Force direct attack conventional target acquisition and weapon delivery avionics systems. As a result of this effort, the Air Force gained operator/system performance data from an expanded set of critical laboratory experiments which benefited the Air Force Precision Strike Demonstrations and other target acquisition and weapon delivery programs.

Value/Benefits to DoD:

Supports DoD Management Principle: Address Warfighting Needs

The Air Force received and integrated into their simulator facilities, improved/enhanced aircraft flight and conventional weapon delivery and weapon flyout models not available through in-house R&D project funds. The data produced was made available to the Air Force Precision Strike Demonstration Program (ARTEMIS), to HQ Air Combat Command Deputy for Requirements, to AFRL Science and Technology, and to several bomber aircraft System Program Offices. The data gave the laboratory insight into expected systems performance, operational utility and the identification of crew station integration and training system impacts. This CRADA allowed the actual warfighters, who would someday use the equipment, to provide feedback to Northrop on their system.

Supports DoD Management Principle: Reduce cost

The feedback from the warfighters on the Northrop system provided Northrop with information that was used to modify and improve their design early in the development cycle, saving Northrop and the Government time and money.

Benefits to Non-Federal Partner:

Early feedback from the warfighters on the target acquisition and weapon delivery avionics systems was used to modify and improve the design early in the development cycle.

Other Benefits:

This CRADA, which is ongoing, has allowed a concept to be evaluated very early in the program in a non-competitive environment which benefited both partners. The Air Force received \$300K in reimbursement costs from Northrop.

AF7

Title: Test and Evaluation of Imaging System

Federal Partner: U.S. Air Force Development Test Center, Eglin AFB

Federal POC: Russell Bauldree

Non-Federal Partner: Eastman Kodak Company

Status: Closed

Summary:

The purpose of this CRADA was to evaluate the performance of the Kodak Megapixel Imaging Technology (MITE) Imaging System against ground threat targets under a variety of tactical flight conditions. This work was used as a proof of concept leading to a fully ruggedized, fieldable tactical imaging system and provided insights into the applicability of this technology to military flight operations. The MITE system was integrated into a Supersonic Airborne Tri-Gimbal Infrared System pod by Air Force personnel and tested at Eglin AFB over a land test range using a high performance aircraft.

Value/Benefits to DoD:

Supports DoD Management Principle: Address Warfighting Needs

The imaging system was integrated into an F15 so that it could be evaluated by an actual pilot who would be using the system. The Air Force received hands-on experience with state-of-the-art technology that may provide an increased operational capability.

Supports DoD Management Principle: Strengthen the Industrial Base

As a result of this evaluation, Kodak was able to refine the design leading to the commercialization of a new product.

Benefits to Non-Federal Partner:

Kodak received an assessment of their product, which allowed them to fine-tune the imaging system which led to design modifications of the MITE system before final production efforts were initiated. Kodak was able to commercialize a new product, therefore, enhancing their market position in this area.

Other Benefits:

In Kodak advertising the evaluation performed at the Eglin test facility, interest by other industrial customers who could also benefit from the test and evaluation expertise was generated, thereby, providing additional business for the Eglin facility.

AF8

Title: USAF Cooperative Research and Development Agreement Between Weber State University and the Science and Engineering Laboratory

Federal Partner: Ogden Air Logistics Center, Technology and Industry Support Directorate, (OO-ALC/TI)

Federal POC: Steve Nelson

Non-Federal Partner: Weber State University (WSU)

Non-Federal POC: Todd Nilsen

Status: Open

Summary:

Weber State University (WSU) is a Center for Excellence for Chemical and Materials Analysis which attracts research projects from local private sector businesses. Analytical costs associated with these research projects are paid by these businesses to WSU. To support these research projects, a CRADA between the Ogden Air Logistics Center, Technology and Industry Support Directorate (OO-ALC/TI) and WSU was developed to provide WSU faculty and staff access to the Air Force Laboratory test instrumentation and/or its science and engineering personnel. WSU pays the Air Force its normal shop rate for costs incurred in item testing, equipment usage, training, and consultive work for these research projects.

Value/Benefits to DoD:

Supports DoD Management Principle: Promote Basic Research

This CRADA established a cooperative association between university academia and Air Force scientists. DoD expertise as well as facilities were shared with the university and the community thus fostering and promoting research between the two partners. Through this agreement, the OO-ALC/TI laboratory personnel was exposed to collegiate industrial technology, current research that is adaptive, fellowship with professional individuals, and associations with graduate students that may someday be future DoD scientists, engineers and technicians.

Although the intent of this CRADA is to promote basic research, individual projects pursued under this agreement may support other DoD S&T management principles.

Benefits to Non-Federal Partner:

This CRADA has allowed the WSU lab personnel and collegiate staff to resource unique laboratory testing, access particular scientific equipment, and become involved in consultative evaluations with experienced DoD scientific and engineering personnel. The exchange of test data, consultative sessions and professional personnel interaction has exposed WSU's chemical/materials staff and student population to realistic industrial laboratory education.

AF9

Title: Warhead Arena Test

Federal Partner: U.S. Air Force Development Test Center, Eglin AFB

Federal POC: Dennis Schneider

Non-Federal Partner: Hughes Missile Systems

Non-Federal POC: Thomas Bootes

Status: Closed

Summary:

The purpose of this CRADA was to determine the blast and fragmentation characteristics of a Hughes technology demonstration warhead. The data collected during this effort was to be used in effectiveness analyses to support both warhead design efforts as well as advanced explosives development.

The test was conducted at the arena test facility at Eglin AFB. Eglin was reimbursed \$58K for the use of their facilities for this testing. This CRADA enabled Hughes to use an arena test site which exists at Eglin AFB to test a warhead.

Value/Benefits to DoD:

Supports DoD Management Principle: Promote Basic Research

Warhead fragmentation and blast characteristics test data was obtained in support of Hughes proprietary technology demonstration warhead design. This test data provided Eglin, AFB with insight into the fragmentation pattern of a new warhead design as well as the performance of the explosive fill.

Benefits to Non-Federal Partner:

Through the work performed under this CRADA, Hughes was able to demonstrate to the Air Force that their warhead had some very unique features. The knowledge gained in fragmentation patterns of the new warhead design as well as performance of the explosive fill led to future contracts in this area.

AF10

Title: Whole Spacecraft Isolation System for Taurus/GEOSAT

Federal Partner: U.S. Air Force Research Laboratory, Space Vehicles Directorate, (AFRL/VS)

Federal POC: Dr. Dino Scullli

Non-Federal Partner: Orbital Sciences Corporation (ORBITAL)

Non-Federal POC: Sharon Roberts

Status: Open

Summary

The Air Force Research Laboratory (AFRL), Space Vehicles Directorate has been actively pursuing ways to reduce loads imparted to satellites. A concept developed at AFRL is a "whole-spacecraft isolation system" in which the vibrations imparted to the satellite are reduced. This system replaced the 60 bolts that attach the separation system to the avionics cone and exceeded or met all performance requirements levied by ORBITAL.

Under this CRADA between ORBITAL and AFRL, AFRL was to design, build and flight qualify a whole-spacecraft isolation system and ORBITAL was to fly the AFRL's isolation system on their Taurus/GEOSAT Follow-On (GFO) mission (GFO is a Navy satellite being built by Ball Aerospace). In return, ORBITAL would recover the GFO safety margins using the whole-spacecraft isolation system. This flight opportunity with ORBITAL occurred because the Navy satellite GFO had unsatisfactory stress margins on ORBITAL's Taurus launch vehicle, and the AFRL's whole spacecraft isolation system could significantly recover their stress margins.

Value/Benefits to DoD:

Supports DoD Management Principle: Address Warfighting Needs

Any reduction in launch loads corresponds directly to savings in satellite weight which can then be used for additional instruments to increase the science or performance of the satellite. Also, the extra weight can be used to add more propellant to the satellite; thereby, increasing the lifetime of the satellite.

Supports DoD Management Principle: Reduce Cost

The whole-spacecraft isolation system helps reduce life-cycle costs of future Air Force satellite systems by significantly reducing the launch vehicle environments. It is projected that this system has saved the Navy GFO program a few million dollars and 3-6 months in redesign efforts. Similar results are expected for all other satellites launches.

Supports DoD Management Principle: Promote Basic Research

The Air Force attained and analyzed actual flight data from ORBITAL on the performance of the isolation system relative to its performance from simulation and ground testing.

Benefits to Non-Federal Partner:

In reducing launch loads imparted to the GFO satellite, additional capabilities can be used on future satellites. The satellite businesses welcomes the opportunity to increase satellite capabilities.